IN THE CLAIMS

1. A method for managing the distribution of datapackets, the method comprising the steps of:

5   associating a service-level policy that limits allowable bandwidths to particular nodes in a hierarchical network;

classifying datapackets moving through said hierarchical network according to a particular service-level 10 policy;

managing all datapackets moving through said hierarchical network from a variable-depth queue in which each queue entry includes service-level policy bandwidth allowance for a node in said network through which a 15 corresponding datapacket must pass;

repeatedly scanning said variable-depth queue to determine whether a datapacket should be forwarded through said node by checking for enough bandwidth-allocation credits; and

20   replenishing an account of said bandwidth-allocation credits taking into account a variable delay caused by scanning said variable-depth queue.

2. The method of claim 1, further comprising the step 25 of:

testing in parallel whether a particular datapacket should be delayed in a buffer or sent along for every hierarchical node in said network through which it must pass.

3. The method of claim 1, further comprising the step of:

constructing a single queue of entries associated with corresponding datapackets passing through said
5   hierarchical network such that each entry includes a pointer to the actual packet node pointers and the corresponding hierarchical nodes that point to the data structures containing availabe bandwidth credits in said network through which a corresponding datapacket must pass.
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4. A means for managing the distribution of datapackets, comprising:

means for associating a service-level policy that limits allowable bandwidths to particular nodes in a
15   hierarchical network;

means for classifying datapackets moving through said hierarchical network according to a particular service-level policy;

means for managing all datapackets moving through
20   said hierarchical network from a variable-depth queue in which each queue entry includes service-level policy bandwidth allowance for a node in said network through which a corresponding datapacket must pass;

means for repeatedly scanning said variable-depth
25   queue to determine whether a datapacket should be forwarded through said node by checking for enough bandwidth-allocation credits; and

means for replenishing an account of said bandwidth-allocation credits taking into account a variable
30   delay caused by scanning said variable-depth queue.

5. The means of claim 4, further comprising:

   means for testing in parallel whether a particular datapacket should be delayed in a buffer or sent along for

5 every hierarchical node in said network through which it must pass.

6. The means of claim 4, further comprising:

   means for constructing a single queue of entries

10 associated with corresponding datapackets passing through said hierarchical network such that each entry includes a pointer to the actual packet node pointers and the corresponding hierarchical nodes that point to the data structures containing availabe bandwidth credits for every

15 hierarchical node in said network through which a corresponding datapacket must pass.

7. A network management system, comprising:

   a protocol processor providing for header

20 inspection of datapackets circulating through a network and providing for an information output comprising at least one of source IP-address, destination IP-address, port number, and application type;

   a classifier connected to receive said information

25 output and able to associate a particular datapacket with a particular network node and a corresponding service-level policy bandwidth allowance;

   a variable-depth queue comprising individual entries related to said datapackets circulating through said

30 network, and further related to a network node through which each must pass; and

a traffic-shaping cell providing for an inspection of each one of said individual entries and for outputting a single decision whether to pass through or buffer each of said datapackets in all network nodes through which each must

5 pass;

wherein, the traffic-shaping cell repeatedly scans said variable-depth queue to determine whether a datapacket should be forwarded through said node by checking for enough bandwidth-allocation credits, and it replenishes an account

10 of said bandwidth-allocation credits taking into account a variable delay caused by scanning said variable-depth queue.

8. The system of claim 7, further comprising:

an output scheduler and marker for identifying

15 particular ones of the individual entries in the variable-depth queue that are to be passed through or buffered.

9. The system of claim 7, wherein:

at least one of the protocol processor, classifier,

20 and traffic-shaping cell, are implemented as a semiconductor intellectual property and operate at run-time with the variable-depth queue.